# PACSystems* RX3i

## IC695ETM001-JX

*Ethernet Interface Module*

## Important Product Information

The Ethernet Interface Module, IC695ETM001, connects a PACSystems RX3i controller to an Ethernet network. It enables the RX3i controller to communicate with other PACSystems equipment and with Series 90 and VersaMax controllers. The Ethernet Interface provides Transmission Control Protocol and Internet Protocol (TCP/IP) communications with other control systems, host computers running the Host Communications Toolkit or programmer software, and computers running the TCP/IP version of the programming software. These communications use the Service Request Transport Protocol (SRTP), Modbus TCP, and Ethernet Global Data (EGD) protocols over a four-layer TCP/IP (Internet) stack.

Features of the RX3i Ethernet Interface include:

- Full programming and configuration services. Firmware upgrades from the RX3i CPU using the WinLoader software utility, which is supplied with updates to the Ethernet Interface software.

- Periodic data exchange using Ethernet Global Data (EGD).

- EGD Commands to read and write controller and EGD exchange memory over the network.

- TCP/IP communication services using SRTP.

- Support for SRTP Channels, Modbus/TCP Server, and Modbus/TCP Client

- Built-in Station Manager for on-line supervisory access to the Ethernet Interface. Dedicated Station Manager port.



Figure 1: ETM001 Front View

- Two auto-sensing 10Base T / 100Base TX RJ45 shielded twisted-pair Ethernet ports for direct connection to either a 10BaseT or 100BaseTX IEEE 802.3 network without an external transceiver. There is only one interface to the network (only one Ethernet MAC address and only one IP Address).

- Internal network switch with Auto negotiate, Sense, Speed, and crossover detection.

- Recessed Ethernet Restart pushbutton permits manually restarting the Ethernet firmware without power cycling the system.

- LEDs: Ethernet OK, LAN OK, Log Empty, individual port activity and speed LEDs.

- Configurable stand-alone Redundant IP Addressing, which allows a single IP Address to be assigned to corresponding Ethernet modules in two different controllers. The Redundant IP Address is configured in addition to the normal unique IP Address of each Ethernet module. Under application logic control, only the Ethernet module in the active unit can use the Redundant IP Address.

- Time synchronization to SNTP Time Server on Ethernet network (when used with Release 5.00 or later CPU module).
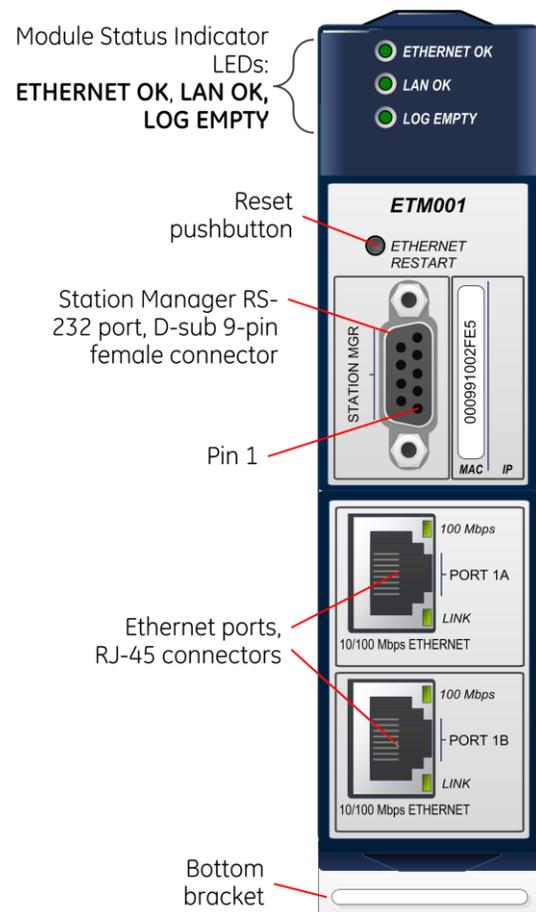
## IC695ETM001 Specifications

| | |
|---|---|
| **Ethernet Processor Speed** | 200 MHz |
| **Connectors** | - Station Manager (RS-232) Port: 9-pin female D-connector<br>- Two 10BaseT / 100BaseTX Ports: 8-pin female shielded RJ45 |
| **LAN** | IEEE 802.2 Logical Link Control Class I<br>IEEE 802.3 CSMA/CD Medium Access Control 10/100 Mbps |
| **Number of IP Addresses** | One |
| **Number of Ethernet Port Connectors** | Two. both are 10BaseT / 100BaseTX with auto-sensing RJ45 connection. |
| **Embedded Ethernet Switch** | Yes – Allows daisy-chaining of Ethernet nodes. |
| **Serial Port** | Station Manager Port:     RS-232 DCE, 1200 – 115,200 bps. |

Refer to the *PACSystems RX3i System Manual*, GFK-2314, for product standards and general specifications.

## Ethernet Interface Status Bits

**Note:**    Unless **LAN Interface OK** (Status Bit 16) is set, the other status bits are invalid. Bit 1 is lsb.

*LAN Interface Status Bits*

| | |
|---|---|
| 1 | Port 1A full duplex |
| 2 | Port 1A 100Mbps |
| 3 | Port 1B full duplex |
| 4 | Port 1B 100 Mbps |
| 5 | Network Time Locked |
| 6 | Redundant IP Address is active |
| 7-8 | Reserved |
| 9 | Any Channel Error (error on any channel) |
| 10–12 | Reserved |
| 13 | LAN OK |
| 14 | Resource problem |
| 15 | Module Overtemperature |
| 16 | LAN Interface OK |

*Channel Status Bits (two for each channel)*

| | |
|---|---|
| 17 | Channel 1 Status (SRTP: Data Transfer) |
| 18 | Channel 1 Status (SRTP: Channel Error) |
| … | … |
| 79 | Channel 32 Status (SRTP: Data Transfer) |
| 80 | Channel 32 Status (SRTP: Channel Error) |

## Indicator Light Emitting Diodes (LEDs)

| LED | State | | Indicates |
|---|---|---|---|
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✿<br>○<br>○ | Fast Blink<br>Off<br>Off | Performing Diagnostics |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✿<br>○<br>○ | Slow Blink<br>Off<br>Off | Waiting for Ethernet configuration from CPU |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✿<br>●✿○<br>✿ | Slow Blink<br>On/Traffic/Off *(EOK and STAT blink in unison)*<br>Slow Blink | Waiting for IP Address |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ●<br>●✿○<br>●○ | On<br>On/Traffic/Off<br>On/Off | Operational |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✿<br>○<br>○ | Blink error code<br>Off<br>Off | Hardware failure. See chapter 11 for blink code definitions. |
| ETHERNET OK<br>LAN OK<br>LOG EMPTY | ✿<br>✿<br>✿ | Slow Blink<br>Slow Blink<br>Slow Blink *(All LEDs blink in unison; pattern same while awaiting or performing load)* | Firmware Update |

## Field Wiring Station Manager (RS-232) Port Pin Assignment

| Pin No[1] | Signal | Direction | Description |
|---|---|---|---|
| 1 | DCD | IN | Data Carrier Detect |
| 2 | TX | OUT | Transmit Data |
| 3 | RX | IN | Receive Data |
| 4 | DSR | IN | Data Set Ready |
| 5 | GND | | Signal Ground |
| 6 | DTR | OUT | Data Terminal Ready |
| 7 | CTS | IN | Clear to Send |
| 8 | RTS | OUT | Ready to Send |
| 9 | RI | IN | Ring Indicator |

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[1] Pin 1 is at the bottom right of the Station Manager port connector as viewed from the front of the module (see Figure 1).

## Hardware Installation

### Initial Checks

Upon receiving your RX3i equipment, carefully inspect all shipping containers for damage. If any part of the system is damaged, notify the carrier immediately. The damaged shipping container should be saved as evidence for inspection by the carrier.

As the consignee, it is your responsibility to register a claim with the carrier for damage incurred during shipment. GE Intelligent Platforms will fully cooperate with you, however, should such action be necessary.

After unpacking the RX3i equipment, record all serial numbers. Serial numbers are required if you should need to contact Customer Care during the warranty period. All shipping containers and all packing material should be saved should it be necessary to transport or ship any part of the system.

Verify that all components of the system have been received and that they agree with your order. If the system received does not agree with your order, contact Customer Care.

### Installation Location

This product is intended for use with the RX3i system. Its components are considered open equipment (having live electrical parts that may be accessible to users) and must be installed in an ultimate enclosure that is manufactured to provide safety. As a minimum, the enclosure shall provide a degree of protection against solid objects as small as 12mm (e.g. fingers). This equates to a NEMA/UL Type 1 enclosure or an IEC60529 IP20 rating providing at least a pollution degree 2 environment. For details about installing RX3i rack systems, refer to GFK 2314.

If you need technical help, contact Technical Support. For phone numbers and email addresses, see the back cover of this Guide.

### Installation in Hazardous Areas

The following information is for products bearing the UL marking for Hazardous Areas or ATEX marking for explosive atmospheres:

#### CLASS 1 DIVISION 2 GROUPS ABCD

- This equipment is an open-type device and is meant to be installed in an enclosure suitable for the environment that is only accessible with the use of a tool.

- Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or nonhazardous locations only.

⚠️ **Warning** – EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

⚠️ **Warning** – WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND

⚠️ **Warning** – DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

⚠️ **Warning** – EXPLOSION HAZARD - USB PORT IS ONLY FOR USE IN NONHAZARDOUS LOCATIONS, DO NOT USE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

#### ATEX Zone 2

This product must be mounted in an enclosure certified in accordance with EN60079-15 for use in Zone 2, Group IIC and rated IP54. The enclosure shall only be able to be opened with the use of a tool.

## Module Installation

This module is compatible with all RX3i CPU models, except CPE400.

The ETM001 must be installed in the main (CPU) rack of an RX3i system, using a Universal Backplane such as IC695CHS007, CHS012 or CHS016.

The ETM001 supports insertion/removal while power is applied to the rack (hot swap).

1. RX3i rack power may be off or on ("hot insertion").

2. Holding the module firmly, align the module with the correct slot and connector, then swing the module down until the module's connector engages the backplane's backplane connector. Visually inspect the module to be sure it is properly seated.

3. Insert the two provided M3x5mm machine screws through the module's bottom bracket into threaded holes in the bottom of the backplate and screw them several turns using a #1 Phillips screwdriver. Tighten to 0.7 N-m (6 in-lbs).

## Related Documents

For additional information about the Ethernet Interface Module, refer to the following publications:

| | |
|---|---|
| *PACSystems RX7i, RX3i and RSTi-EP CPU Reference Manual* | GFK-2222 |
| *PACSystems RX7i, RX3i and RSTi-EP CPU Programmer's Reference Manual* | GFK-2950 |
| *PACSystems RX7i, RX3i and RSTi-EP TCP/IP Ethernet Communications User Manual* | GFK-2224 |
| *PACSystems TCP/IP Ethernet Communications Station Manager User Manual* | GFK-2225 |
| *PACSystems Hot Standby CPU Redundancy User Manual* | GFK-2308 |
| *PACSystems Battery and Energy Pack Manual* | GFK-2741 |
| *Proficy Machine Edition Logic Developer Getting Started* | GFK-1918 |
| *PACSystems RXi, RX3i, RX7i and RSTi-EP Controller Secure Deployment Guide* | GFK-2830 |
| *PACSystems RX3i System Manual* | GFK-2314 |
| *PACSystems RX3i Ethernet Network Interface Unit User's Manual* | GFK-2439 |

## Additional Support

For support and information, visit GE Intelligent Platforms' website at [www.geautomation.com](http://www.geautomation.com). The files for this manual and other related documentation are available there. Additional region- and language-specific websites and telephone numbers are found there as well.

## Important Product Information for this Release

A number of firmware issues have been resolved, as documented in *Problems Resolved by this Release*.

The hardware change (from -H to -J) was necessitated by component obsolescence. There is no change to form, fit or functionality arising from the hardware change.

### Updates

The IC695ETM001 is field-upgradeable using the firmware upgrade utility. To upgrade an existing ETM001 to firmware version 6.42, you will need the upgrade kit 44A753032-G20, which can be downloaded from www.geautomation.com/support.

The hardware cannot be upgraded in the field.

### Functional Compatibility

| Functional Compatibility | |
|---|---|
| **Subject** | **Description** |
| **Hot Swap requires CPU firmware 2.51** | Do **not** remove or insert the IC695ETM001 while powered unless the CPU is running firmware release 2.51 or higher. This firmware is available in upgrade kit 44A7522290-G01. |
| **SRTP and EGD performance differs from Series 90*-30** | SRTP and EGD performance in the RX3i differs slightly from the Series 90-30. Each RX3i Ethernet Interface supports a greater number of SRTP connections and EGD exchanges.<br><br>The RX3i currently has several SRTP and EGD operational restrictions compared to the Series 90-30. When migrating Series 90-30 Ethernet applications to the RX3i, please carefully read the *Ethernet Operational Notes*. |
| **Series 90-30 LAN Interface module (IC693CMM321) not supported by RX3i** | The Series 90-30 LAN Interface Module (IC693CMM321) is not supported by the RX3i and should not be placed in an RX3i rack. (Series 90-30 CPUs with embedded LAN Interface, IC693CPU364 and IC693CPU374, like any Series 90-30 CPU, should not be placed in an RX3i rack.) |
| **Modbus/TCP support** | Release 3.60 of the PACSystems Ethernet Interface adds Modbus/TCP Client Channels capability. It supports Modbus Conformance Class 0 function codes 3 and 16, Conformance Class 1 function codes 1, 2, 4, 5, 6, and 7, and Conformance Class 2 function codes 15, 22, 23, and 24. PACSystems Ethernet supports 32 client connections shared between all client protocols. For example, if 16 client connections are used for SRTP channels, there are 16 client connections available for Modbus/TCP channels. Any given channel can be assigned to only one protocol at a time. |
| **Programmer version requirements** | Proficy* Machine Edition Logic Developer 5.8 or later must be used to perform Run Mode Store of EGD exchanges.<br><br>Proficy Machine Edition Logic Developer 5.7 or later must be used for Release 5.00 new features.<br><br>Proficy Machine Edition Logic Developer 5.5 Service Pack 2 or later must be used for Release 4.00 new features.<br><br>Proficy Machine Edition Logic Developer 5.0 Service Pack 3 or later must be used to program the RX3i CPU for Modbus/TCP Server operation. |
| **CIMPLICITY* Plant Edition version requirements** | CIMPLICITY Plant Edition 6.1 Service Pack 1a with Update 040204_s90tcp_6101 or Service Pack 2 or later must be used for Ethernet communications with PACSystems. |

### New Features and Enhancements in this Release

| Subject | Description |
|---|---|
| **Cyber Security** | Security enhancements have been made to harden the product against an attacker. |

## Problems Resolved by this Release

| Subject | ID code | Description |
|---------|---------|-------------|
| **Run Mode Store of EGD does not work in FW 6.41** | DE4073 SFDC: 00423545 | In RX3i Ethernet firmware 6.40/6.41, an issue was introduced whereby an ETM001 is reset by the Controller when a Run Mode Store of EGD is attempted. The issue is corrected in firmware version 6.42. This problem does NOT exist on RX3i ETM firmware versions prior to 6.40. |
| **TCP Reset Flag set while establishing connection with remote ETM001 with FW 6.41** | DE4110 SFDC: 00441388 | In RX3i Ethernet firmware 6.40/6.41, an issue was introduced whereby a remote ETM001 has problems maintaining a TCP connection with PME. When the issue occurs, it interferes with downloads to or uploads from the Controller. In the most extreme cases, TCP communications between PME and the remote ETM001 are impossible to maintain. This issue is less prevalent with local TCP connections. However, it may still occur under the right conditions. The issue is corrected in firmware version 6.42. This problem does NOT exist on RX3i ETM firmware versions prior to 6.40. |
| **Ethernet interface may lock up after a power cycle whenever hardware configuration contains produced EGD exchanges** | DE4116 | An error condition has been discovered where an ETM001 may, on rare occasions, never establish communications on the network due to a lock-up condition following a power cycle. When the lock-up condition occurs, LED activity on the module appears normal except for the LAN OK LED. The LAN OK LED's state may be on or off, but it never blinks when the lock-up condition occurs. In addition, there are no faults in the Controller fault table indicating that anything is wrong. Finally, this error condition is typically seen in modules that are configured to produce EGD exchanges. The issue is corrected in firmware version 6.42. |

## Release History

| | | Release History | |
|---|---|---|---|
| **Catalog Number** | **Firmware Version** | **Date** | **Comments** |
| IC695ETM001-JX | 6.42 | Nov 2017 | Resolves two issues introduced in FW6.41: <br> • ETM is reset whenever Run Mode Store of EGD is attempted <br> • Remote ETM has problems communicating with PME <br> Resolves a third issue: <br> • Ethernet interface may lock up after a power cycle whenever hardware configuration contains produced EGD exchanges. |
| IC695ETM001-HW | 6.41 | Mar 2016 | In RX3i Ethernet firmware 6.40, an issue was introduced whereby an ETM001 will continue to respond to the Redundant IP Address even after it has switched to backup mode. This problem has been corrected in firmware version 6.41. <br> This problem does NOT exist on RX3i ETM firmware versions prior to 6.40. |
| IC695ETM001-HV | 6.40 | Feb 2016 | An enhancement was made to prevent the module from becoming unresponsive and requiring a power cycle if it was subjected to heavy network storm traffic. Reference: GE Security Advisory is GE15-09, entitled *Network Storm Denial of Service*. |
| IC695ETM001-HU | 6.31 | Nov. 2015 | Firmware release 6.31 (IC695ETM001-HU) provides a Field Upgrade Kit to address an issue identified with IC695ETM001-GT where the module can unexpectedly go into firmware update mode (Ethernet OK, LAN OK, and Log Empty LEDs blink in unison). While in firmware update mode, the module is unresponsive to Ethernet traffic. |
| IC695ETM001-HU | Firmware 6.30 Boot 3.71 | Nov. 2014 | This hardware release (IC695ETM001-HU) addresses an issue identified with IC695ETM001-GT where the module can unexpectedly go into firmware update mode (Ethernet OK, LAN OK, and Log Empty LEDs blink in unison). While in firmware update mode, the module is unresponsive to Ethernet traffic. |
| IC695ETM001-GT | 6.30 | Nov. 2014 | This hardware release addresses a component obsolescence issue. There are no changes to form, fit, or function. |

| | | | *Release History* | | | | |
|---|---|---|---|

| Catalog Number | Firmware Version | Date | Comments |
|---|---|---|---|
| IC695ETM001-FT | 6.30 | Oct. 2014 | Firmware version 6.30 fixes the following issues:<br>• In very rare conditions closing Modbus or SRTP session can result in a 3-5 blink code.<br>• With unicast SNTP the ETM could lose server lock and then (1) never show any server as locked again and (2) not attempt to switch to another server. In v6.30, (1) Lock status can be restored when a server becomes consistent and (2) SNTP will attempt to switch to another server when the current server becomes inconsistent.<br>• The ETM clock can drift away from the locked-on server's time at a several msec/day rate.<br>• Removed an extraneous log event. The extraneous log event would occur (1) on battery-backed power-up and (2) store of hardware configuration, when the user configures the ETM for SNTP, but does not configure the ETM for daylight savings time correction. |
| IC695ETM001-FS | 6.21 | Aug. 2014 | Replaces the module's plastic housing with a metal case, improving noise immunity, reducing emissions, and increasing the mechanical robustness of the product. No change to the module's firmware or functionality. |
| IC695ETM001-ES[2] | 6.21 | Jan. 2014 | Ethernet Firmware version fixes an issue with calculating DST correction in the European Union when SNTP is enabled. |
| IC695ETM001-ER | 6.20 | Jul. 2013 | Adds support in SNTP for local time zones and daylight savings time and resolves the field issues described on page 7. |
| IC695ETM001-EP[2] | 6.14 | Jul. 2012 | Resolves an issue with a spurious blink code being displayed during SRTP communications with CIMPLICITY Plant Edition software. |
| IC695ETM001-EN | 6.13 | Apr. 2012 | Addresses a field issue and a product security issue. For details, refer to GFK-2332M. |
| IC695ETM001-EM | 6.12 | Dec. 2011 | Disables several unnecessary services in the firmware that otherwise could result in disruption of system operation and/or data corruption. For details, refer to GFK-2332L. |
| IC695ETM001-EL[2] | 6.11 | Nov. 2011 | Resolves an issue with missed EGD samples. For details, refer to GFK-2332K. |
| IC695ETM001-EK | 6.10 | Sep. 2011 | For problems resolved, refer to GFK-2332J. |
| IC695ETM001-EJ | 6.00 | Sep. 2009 | Adds an SRTP inactivity timeout for better recovery from lost communication with the programmer. For details and problems resolved, refer to GFK-2332H. |
| IC695ETM001-EH | 5.51 | Jan. 2009 | Adds new diagnostics capabilities. For details and problems resolved, refer to GFK-2332G.<br>Hardware version Ex updates the IC695ETM001 for RoHS compliance. |
| IC695ETM001-DG | 5.50 | May 2008 | Adds ability to modify produced and consumed EGD exchanges during run mode store. For problems resolved, refer to GFK-2332F. |
| IC695ETM001-DF | 5.01 | Dec. 2007 | For problems resolved, see GFK-2332E. |
| IC695ETM001-DE | 5.00 | Aug. 2007 | Hardware changes to improve performance during hot swaps. For additional new features and problems resolved, refer to GFK-2332D. |
| IC695ETM001-CD | 3.81 | May 2006 | Added support for eight Ethernet interfaces in the RX3i main backplane. For details and problems resolved, refer to GFK-2332C. |
| IC695ETM001-CC | 3.60 | Nov. 2005 | Added support for Modbus/TCP client and Ethernet plug-in applications. For details and problems resolved, refer to GFK-2332B. |
| IC695ETM001-AB | 3.00 | Apr. 2005 | For new features and problems resolved, refer to GFK-2332A. |
| IC695ETM001-AA | 2.51 | Aug 2004 | Initial release. |

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[2] Available as upgrade kit only.

## Restrictions and Open Issues

| Restrictions and Open Issues | |
|---|---|
| **Subject** | **Description** |
| **Number of SRTP requests tallied may vary** | When running multiple SRTP client channels, the number of requests, as reported by the client and the server, may differ between the connections. |
| **REPP does not save results of aborted PING** | The Station Manager REPP command does not retain the results of a PING that is aborted due to error. Results are reported when the PING is aborted, but subsequent REPP commands give the results of the last successfully terminated PING. |
| **Multiple log events** | The Ethernet Interface sometimes generates multiple exception log events and Controller Fault Table entries when a single error condition occurs. Under repetitive error conditions, the exception log and/or Controller Fault Table can be completely filled with repetitive error messages. |
| **Intermittent SNTP loss of synchronization** | Under moderately heavy EGD traffic load, the Ethernet Interface may occasionally lose synchronization with its SNTP time server and generate exception log Event 29H, Entry 2=000bH. |
| **SRTP communication delays** | Average latency of communications on SRTP channels may vary considerably due to TCP retransmissions. SRTP client applications should be designed to take this variance into account. In particular, SRTP client applications migrating from Series 90 SRTP servers to PACSystems may need to lengthen SRTP timeout parameters. |
| **Spurious 'Ethernet Failure' error** | On rare occasions, the error *Module hardware fault* may be reported on the Ethernet daughterboard. The corresponding fault in the exception log is Event = 01H, followed by text *Ethernet failure*. This fault is a nuisance fault and may be ignored. |
| **Spurious Ethernet fault** | In rare instances, after power cycle, the Ethernet Interface may log the following fault, Event = 28H, Entry 2 = 000eH. This fault can be safely ignored. |
| **Unexpected EGD COMMREQ status** | EGD Commands may return COMMREQ Status 9590H (= internal error) instead of the expected B190H (= Can't locate remote node) when unable to locate a remote device on the network. |
| **SRTP server errors can cause timeouts at channel client** | The SRTP Server in the PACSystems Ethernet Interface can encounter various errors if a remote Series 90 client takes down an SRTP connection and then establishes a new connection. This can cause unexpected channel timeout errors 0190H or 0290H at the client. The SRTP server errors in the Ethernet exception log are identified as Event = 02H; Entry 2 may be 001cH, or 0021H. |
| **EGD command range failure can write partial data to controller bit memory** | When an EGD Command attempts a write operation to a bit-mod**e** reference memory range (%I, %Q; %T, %M, %SA, %SB, %SC) where the amount of data to be written exceeds the configured size of that reference memory, the command will return failure status but partial data may be written into the reference memory. The amount of partial data written depends upon the starting bit memory location and the data length as follows:<br><br>▪ If data starts on a byte boundary (location = (8 • n) + 1), no partial data is written.<br>▪ If data does not start on a byte boundary (location = (8•n)+1) and data exceeds the configured reference memory by 8 or more bits, partial data is written from the starting location to the next byte boundary after the starting location.<br>▪ If data does not start on a byte boundary (location = (8•n)+1) and data exceeds the configured reference memory by less than 8 bits, partial data is written from the stating location to the end of configured reference memory.<br><br>For a Write PLC Memory command, this can occur when writing data into the target PLC. For Read PLC Memory or Read Exchange commands, this can occur when writing data received from the target controller into the local CPU memory. The logic application must not use any data returned to the local CPU if the EGD command status indicates failure.<br><br>To avoid writing partial data to the local or remote PLC, be sure bit memory data transfers do not exceed the configured reference memory sizes at the appropriate PLC. |
| **Do not operate with CPU in incorrect slot** | The operation of the Ethernet interface is disrupted if the RX3i CPU is placed in a slot other than the one in which it is configured. Various Ethernet exception log events may occur, such as (Event = 02H, Entry 2 = 0030H or 0035H or 0039H or 001eH or 001fH) or (Event = 08H, Entry 2 = 000bH). |

| Restrictions and Open Issues | |
| --- | --- |
| **Subject** | **Description** |
| **No CPU fault logged when Ethernet interface in fatal blink code** | The CPU does not log any Controller or I/O Faults when the Ethernet Interface has a fatal blink code. The application should monitor the LAN interface OK status bit to detect loss of module. |
| **EGD I/O has unexpected variability under heavy load** | EGD I/O has intermittent unexpected variability under heavy load. For a Produced Exchange, EGD samples may occasionally be delayed by as much as a production period or more. |
| **Clearing of large Hardware Configurations may cause Log Event 08/20** | A log Event 08H, Entry 2 =0020H may occur when very large hardware configurations are cleared and transfers are active on other Server connections. This log event can be safely ignored. |
| **Reset pushbutton** | Reset pushbutton action is different from other PACSystems Ethernet products. On the RX3i Ethernet module, the state of the pushbutton when the module powers up can change the behavior of the Restart pushbutton. Under normal operation, a pushbutton press produces a rising-edge signal that triggers a module restart. However, if the pushbutton is pressed when power is activated (either by pressing the pushbutton before turning power on or by continuing to hold the pushbutton in after a restart), the functionality of the pushbutton is inverted. When the pushbutton is later released, an "incorrect" rising-edge is detected, which triggers an inappropriate module restart. This does not occur on other PACSystems Ethernet products. |
| **COMMREQ Status Word value of 0x54A0 occasionally returned for EGD commands** | Occasionally a COMMREQ Status Word value of 0x54A0 is returned after COMMREQs for Ethernet Global Data commands when the previously-transferred command has experienced retries in the network. Executing the COMMREQ again results in successful transfer of the command. |
| **Modbus/TCP channel aborted during power-cycle** | After powering up an RX3i running Modbus/TCP client channels, the establish connection occasionally fails because the server rejects the "open" request from the client. The connection will then succeed if the application retries the open when it sees a 0x9690 or 0xAA90 response to an open request or to the first write request. |
| **Controller response timeout errors (8/08) in Ethernet exception log under extremely heavy SRTP traffic** | Under extremely heavy SRTP traffic conditions, the Ethernet Interface may log an event in the Ethernet exception log (Event 08H, Entry 2 = 0008H) indicating an overload condition. This error terminates the SRTP connection. If this event appears, either the traffic load should be reduced, or the application should use an alternate communications method to verify that critical data transfers were not lost due to the overload. |
| **SRTP channel transfers may take up to 20 seconds after power cycle** | When SRTP communications are interrupted by a power cycle, the Ethernet interface may require up to 20 seconds to reestablish TCP connection used for SRTP communications. |
| ***rmdir* Station Manager command does not work for multi-level directory path** | The *rmdir* Station Manager command does not operate properly with a multi-level directory path. Instead, first change to the parent directory, then delete the target directory without specifying a path. For example, *rmdir dir1/dir2* results in "RMDIR Failed, dir1/dir2 does not exist". Instead, first enter *cd dir1* and then *rmdir dir2*. |
| **Intermittent Ethernet log event 8H/15H after power cycle** | When starting after a power cycle, the Ethernet Interface may intermittently log an exception (Event 08H, Entry 2 = 0015H, Entry 3 = 0000H, Entry 4 = 00aaH). This exception is benign and may be ignored. |
| **Intermittent Modbus/TCP Server log events when using *killms* Station Manager command** | When using the *killms* Station Manager command to manually terminate an active Modbus/TCP server connection, the following Modbus/TCP errors may occur in the Ethernet exception log: Event 2fH, Entry 2 = 0209H, 0212H, 021bH, or 0221H. These errors may be ignored. |
| **Module intermittently unresponsive after reset** | Intermittently, when the module is restarted by using the pushbutton or Station Manager command, the module will blink its OK LED for 5 minutes before completing the restart. After the restart is complete the module fails to communicate with the CPU module. The remedy is to power-cycle the PLC. |

| Restrictions and Open Issues | |
| --- | --- |
| *Subject* | *Description* |
| **A890 COMMREQ status after multiple Modbus open command attempts** | When using a COMMREQ to open a Modbus/TCP Channel to a remote server, if the initial COMMREQ returned an AA90 status, then future Open Commands may return A890 status. This indicates that local networking resources have been consumed and are not available for further connection attempts. If this occurs, the application must wait at least 60 seconds before making the next connection attempt. This will allow networking resources to be released and made available for the next Modbus Open Command. |
| **Modbus/TCP request packets** | The Modbus/TCP server expects to receive each Modbus/TCP request in a separate TCP packet. If multiple requests are sent in a single packet, the server may or may not send a response to each request. If responses are sent to the client, they will be sent in separate TCP packets. |
| **EGD production delayed after Run Mode Store of EGD** | When a produced EGD exchange is added or modified by a Run Mode Store, the exchange will not be produced until one production period of time has elapsed after the completion of the run-mode store. |
| **Station Manager PING commands** | When initiating ICMP echo requests from the PLC via the Station Manager's PING command, the operation occasionally fails and an exception is logged (Event 0eH, Entry 2 = 0006H). |
| **Station Manager *referr* tally** | The EGD Station Manager *referr* tally may be incremented twice when an exchange timeout occurs. Exchange status word reporting works correctly and is not affected. |
| **AUP parameter *wkal_idle* should not allow zero** | Zero is allowed for the *wkal_idle* (TCP keepalive timer) but it is an invalid value. |
| **TCP connection may timeout early if the timeout is set greater than 10 minutes** | If the TCP connection timeout is set higher than 10 minutes, the connection may timeout before the configured value. The connection timeout is derived from three AUP parameters: wkal_idle + (wkal_cnt + 1) • wkal_intvl. |

## Ethernet Operational Notes

| Ethernet Operational Notes | |
|---|---|
| **Subject** | **Description** |
| **Remote Station Manager access is disabled until Station manager password is changed** | User should change the station manager password to other than the default password. The remote station manager access is disabled until the station manager password is changed to other than the default password. |
| | The station manager password can be changed using an AUP file. (Refer to Appendix A, Configuring Advanced User Parameters in *TCP/IP Ethernet Communications for PACSystems User's Manual,* GFK-2224K.) |
| **Changing the default Station Manager password is strongly recommended** | GE Intelligent Platforms strongly recommends that you change the Station Manager password to a value other than the default. Before a configuration has been stored to the CPU, you can change the password by using the *CHPARM* command to modify the Advanced User parameter *stpasswd*. For details on using this command, refer to the *Station Manager Manual,* GFK-2225. |
| | It is **not recommended** that you change any AUP other than *stpasswd*. |
| | 1. Use the current password to access the Modify level of the Station Manager. The default password is *system*. |
| | 2. Change the password. |
| | **Example: = chparm stpasswd newpass** |
| | 3. Restart the Ethernet interface or cycle power. Changes made via the CHPARM command do not take effect until the Ethernet interface is restarted or power is cycled. Advanced User Parameters are saved in non-volatile memory. Changes made by the CHPARM command are retained over restart and power cycles, until changed again by the CHPARM command. |
| | 4. To permanently change the Station Manager password, you must change the *stpasswd* parameter in the AUP file. See the *TCP/IP Ethernet Communications for PACSystems User's Manual*, GFK-2224 for details. (After the CPU configuration has been stored into the CPU, the CHPARM command is prohibited and any previous changes made with it are no longer effective.) |
| **Configuration of IP Address is required before using Ethernet communications** | The Ethernet Interface cannot operate on a network until a valid IP Address is configured. The Ethernet addressing information must be configured prior to actual network operation, or to recover from inadvertent changes to the Ethernet addressing data at the Ethernet Interface. Use one of the following methods to initially assign an IP Address: |
| | ▪ Connect a serial terminal to the Interface's Station Manager port. Then use the CHSOSW command to enter the desired IP Address. For details, see PACSystems TCP/IP Communications Station Manager Manual, GFK-2225. |
| | ▪ Temporarily assign an IP Address to the module using the *SetIP* tool over the Ethernet network. For details, see *TCP/IP Ethernet Communications for PACSystems*, GFK-2224. |
| | ▪ The Ethernet Interface automatically obtains a temporary IP Address from a BOOTP server on the network. For details, see *TCP/IP Ethernet Communications for PACSystems,* GFK-2224. |
| | Once a temporary IP Address has been set up, the Ethernet Interface can be accessed over the network (by the Machine Edition programming software). The programmer should then be used to configure the proper IP Address for the Ethernet Interface. |
| **Default IP Address (0.0.0.0) attempts to set IP Address via BOOTP** | The default IP Address value (0.0.0.0), whether obtained from HW Configuration or backup configuration, causes the Ethernet Interface to request a temporary IP Address from a BOOTP server device on the network. |
| **LAN must be tree, not ring** | The two Ethernet network ports on the PACSystems RX3i Ethernet Interface must not be connected, directly or indirectly, to the same network device. The hub or switch connections in an Ethernet network must form a tree and not a ring; otherwise duplication of packets and network overload may result. In this situation, the RX3i Ethernet modules will continually reset. |
| **Reporting of Duplicate IP Address** | The PACSystems RX3i does not log an exception or a fault in the Controller Fault Table when it detects a duplicate IP Address on the network. |

| Ethernet Operational Notes | |
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| *Subject* | *Description* |
| **Multiple zero period EGD exchanges may not produce similar numbers of samples** | If more than one EGD produced exchange is configured for a production period of zero, the exchanges may not produce similar numbers of samples. Due to the way that scheduling occurs when multiple exchanges are scheduled "as fast as possible", some zero period exchanges may produce significantly more samples than others. For more consistent EGD production, configure the produced EGD exchanges with non-zero production periods. |
| **Changing IP Address while SRTP connection open may generate log events** | Open SRTP Server connections established with a remote SRTP client are not terminated as expected when the RX7i's IP Address is changed (typically by storing a new HW Configuration to the RX7i). A Series 90 SRTP client ("SRTP channels") reports either a 9690H or 0190H status; the SRTP connection may remain open until the connection is terminated as a result of a client timeout. Please refer to *Open Ethernet Problems,* Internal Problem ID Code CR-1434 for more information. |
| **Series 90-30 datagram restrictions** | Series 90-30 – format datagrams are supported, but cannot access %P or %L memory. |
| **Advanced User Parameter *wsnd_buf* should not be changed** | The Advanced User Parameter *wsnd_buf* should not be changed. Changing this value may cause the LAN LED to go out and the Ethernet Interface to drop its connection. |
| **Heavy load can block Station Manager** | As explained in *PACSystems TCP/IP Station Manager Manual*, GFK-2225, Chapter 1, a heavy EGD and/or SRTP load can block Station Manager operation. |
| **One-time delay of EGD Production (and possibly Consumption) if more than 24 SRTP Server connections are started simultaneously** | If more than 24 SRTP Server connections are established simultaneously, EGD Production may be briefly delayed for each connection after the 24th when the connections are first made after power is applied. If EGD consume acceleration has been disabled, then EGD Consumption is also delayed. The delay only occurs once when the SRTP Server connection is established for the first time after Powerup. No delay is experienced for the first 24 SRTP Server connections. |
| **Very heavy EGD production/ consumption at server may cause EGD command timeouts** | Very heavy EGD production and/or consumption at a server device may cause EGD command timeout errors when another device attempts to send EGD commands to that server. If EGD commands must preempt normal production, you may set the Advanced User Parameter *gcmd_pri* to 2 (see GFK-2224, Appendix A). Note that by doing so, EGD exchange production may be delayed. |
| **SRTP Application Timeouts must accommodate network connection overhead** | The application timeouts within SRTP Channels also include the time needed to establish and maintain the underlying network and STRP connection. Examples are establishing the TCP connection for a new channel, establishing communication with the remote device, and TCP retransmissions during Channel operations. If the time needed for TCP connection establishment or maintenance exceeds the user-specified channel application timeout values, an application timeout will occur. Channel application timeouts are temporary errors; the channel continues to run. |
| **Client Channels and Redundant IP** | In a Redundancy System, Client Channel COMMREQs can only be initiated from the unit that owns the Redundant IP Address. Therefore, the user application logic should use Bit 6 in the LAN Interface Status bit area, *Redundant IP Active* as part of their enabling logic that drives a client channel COMMREQ. |
| **Idle Modbus/TCP connection between a Series 90 and a PACSystems may be prematurely terminated** | An idle Modbus/TCP connection between a Series 90 controller and the PACSystems Ethernet Interface may be prematurely terminated. There is an incompatibility between the TCP "Keep-Alive" timer values on the PACSystems Ethernet Interfaces and Series 90 Ethernet Interfaces. The default value of the keep-alive timer for the Series 90 modules is set to a much higher value than for the PACSystems. To keep TCP connections open between a Series 90 Ethernet Interface and a PACSystems Ethernet Interface, the Series 90 Interface Advanced User Parameter *wkal_time* should be set to the value 750 to match that of PACSystems. With this change, TCP connections remain open indefinitely. This also applies to SRTP Client Channels that have infrequent traffic and can be resolved by using the same technique. |
| **Attempt to open 17 or more Modbus server connections may appear successful** | If more than the maximum 16 supported Modbus Server Connections are attempted, the TCP connection may succeed, but no data may be subsequently transferred. |

| Ethernet Operational Notes | |
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| *Subject* | *Description* |
| **SRTP Connections Remain Open after IP Address Changed** | The Ethernet Interface does not terminate all open SRTP connections before changing its IP Address. Once the local IP Address has changed, any existing open TCP connections are unable to normally terminate. This can leave SRTP connections open until their underlying TCP connections time out. If quicker recovery of the SRTP connection is needed, modify the Advanced User Parameter *wkal_idle* to reduce the TCP keep alive timer down to the desired maximum time for holding open the broken connection. Refer to *TCP/IP Ethernet Communications for PACSystems,* GFK-2224, for details. |
| **RX3i CPU Time used for Produced EGD Timestamps** | Changing the Ethernet interface time via the CHTIME command does not affect the timestamp value within EGD exchanges produced from this Ethernet interface. The EGD timestamp value reflects the current CPU time. In Series 90-70 products and the Series 90-30 CPU364, EGD timestamps are taken from the Ethernet interface and do reflect CHTIME modifications. |
| **ENIU Stale Data during Run Mode Store of EGD** | In a large PPS system running 20 ENIUs, when a Run Mode Store is performed that deletes the EGD exchanges for 10 of the ENIUs, the other ENIUs will see the status on their exchanges indicate consumption timeouts during the RMS. At the completion of the RMS, the exchanges operate normally. |
| **One TTL value configuration for all EGD groups** | The system accepts only one TTL value. If you configure a separate TTL value for each EGD group, the minimum TTL value is configured for all EGD groups. |
| **Protection against attack on FTP server** | When the FTP connection is not in use, the configuration parameter, *Maximum FTP Server Connections* should be set to 0. This protects against attack on FTP server. |
| **ETM resets after sending Modbus Connect COMMREQ to itself** | In certain instances, issuing a Modbus Connect COMMREQ to the ETM using the IP Address of the ETM itself may cause the ETM to reset.<br><br>To avoid the possibility of inadvertently resetting the ETM, users should avoid issuing a Modbus Connect COMMREQ to the ETM using the IP Address of the ETM itself. i.e., do not allow an ETM to send a Modbus Connect COMMREQ to itself. |
| **Intermittent TCP Connection Delays After COMMREQ Exception Is Received** | In certain COMMREQ error scenarios, intermittent Read/Write Period Timeouts may occur. This is due to a 3-second delay in the TCP Connection process after a COMMREQ exception is received.<br><br>When this issue occurs, an error status of 0290H is returned in the COMMREQ status word, which may or may not match the expected error status. This issue is only observed when an intentional COMMREQ error has been introduced and sent. It has never been observed during successful COMMREQ processing.<br><br>The user can increase the Period Timeout to avoid this intermittent issue. |
| **Retrieve Detailed Channel Status COMMREQ Returns 9590H Error** | COMMREQ testing indicates that a 9590H error code may be returned when a Retrieve Detailed Channel Status (2002) COMMERQ is sent. The issue occurs approximately 10% of the time in a very heavily loaded system. When the issue occurs, a LAN system-software fault (Event 02H, Entry 2 = 0052H) is also logged. The problem may be due to the Ethernet Interface being asked to perform beyond it capacity. Try transferring less data per message or establishing fewer simultaneous connections as a workaround for this issue. |